Acoustic Stirling Heat Engine

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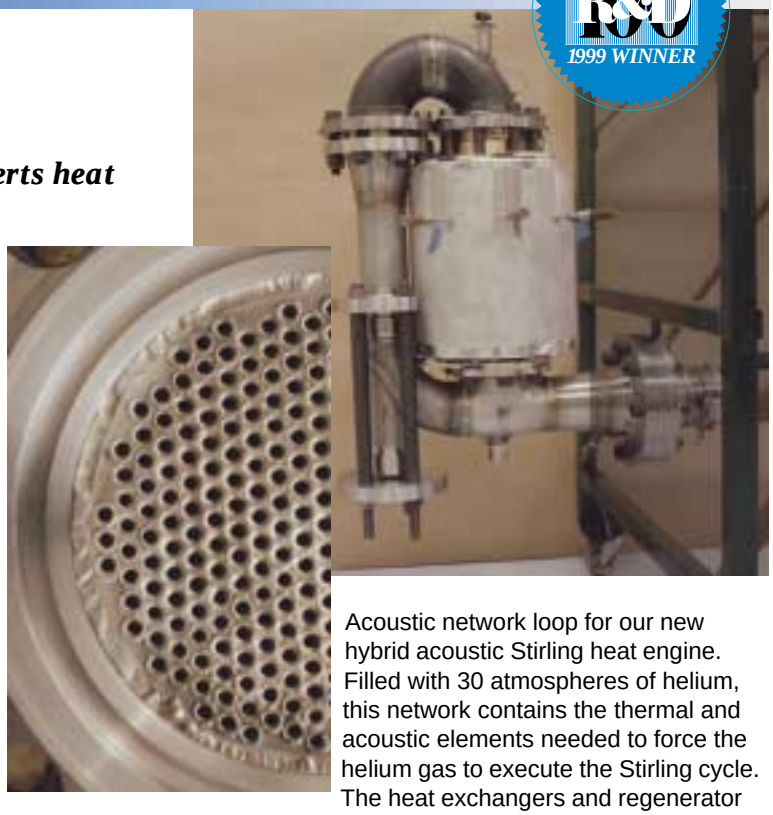
Our new heat engine efficiently converts heat to intense acoustic power in a simple device that comprises only pipes and conventional heat exchangers and has no moving parts. The acoustic power can be used directly in acoustic refrigerators or pulse-tube refrigerators to provide heat-driven refrigeration with no moving parts, or it can be used to generate electricity via a linear alternator or other electroacoustic power transducer. The engine's 30% efficiency and high reliability make medium-sized, natural-gas, liquefaction plants (with a capacity of up to a million gallons per day) and residential cogeneration economically feasible.



Acoustic network loop for our new hybrid acoustic Stirling heat engine. Filled with 30 atmospheres of helium, this network contains the thermal and acoustic elements needed to force the helium gas to execute the Stirling cycle. The heat exchangers and regenerator are housed within the large-diameter insulated segment. The engine's resonator extends off to the right. Combining low-tech hardware and an elegant engineering design, our no-moving-parts engine produces acoustic power from heat with an efficiency of 30%. The inset shows the engine's main welded shell-and-tube heat exchanger.

Applications

The acoustic Stirling heat engine can be used for

- combustion-powered liquefaction of natural gas to recover gas now flared at remote and offshore oil wells;
- residential cogeneration for more efficient energy use;
- local, combustion-powered, air separation and liquefaction to reduce transportation costs for industrial gases; and
- solar- or waste-heat-powered generation of electricity.

Benefits

The benefits of the acoustic Stirling heat engine are that it is

- more efficient than other no-moving-parts heat engines;
- made from inexpensive, low-tech hardware;
- highly reliable; and
- environmentally benign.

Availability of applications for commercial licensing

- Residential cogeneration for more efficient energy use.
- Solar - or waste-heat-powered generation of electricity.

Encumbered:

- Cooling and liquefaction of industrial gases, including natural gas.

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